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Burnt Corral Vegetation Project

Non-Native and Invasive Plant Species Specialist Report

North Kaibab Ranger District, Kaibab National Forest
Coconino County, Arizona

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Introduction

Non-native invasive plant species (NNIPS) are undesirable species which gradually out-compete native plant communities and starve native plants of space, moisture, and nutrients. They are turning diverse native plant communities into monocultures, and disrupt natural ecosystem processes such as; decreasing water infiltration, increasing soil erosion, decreasing water quality, increasing soil salinity, as well as disrupting natural fire regimes. By reducing native plant infestations and altering natural ecosystem functions, they are also reducing the abundance and diversity of native wildlife species, and microorganisms in those ecosystems.

NNIPS distort aesthetic values and recreational opportunities as many species are found along roads, trails, riparian corridors, and developed and dispersed campsites. There are numerous vectors in which non-native and invasive species spread across the landscape. There are some species that have a high reproductive capacity, meaning they produce vast amounts of seeds (>1,000) or numerous root sprouts at once. Natural disturbances such as wind events, rain, floods, snow runoff, and wildfire can carry seeds vast distances. Wildlife and domestic animals can carry seeds by foot, coat, or by seeds they may have ingested and discarded by feces. Human activities contribute largely to the spread of non-native and invasive species. Clothing, shoes, vehicles, and ATV's can also carry seeds great distances.

Concentrations of invasive plants are most noticeable along wildfire scars and along roads where the soil has been disturbed and bare soil exposed.

Under the guidance of the Coconino, Kaibab, and Prescott National Forests Integrated Treatment of Noxious or Invasive Weeds Environmental Impact Statement (2004), the North Kaibab Ranger District (NKRD) has the responsibility to manage NNIPS of concern. Invasive species are treated using Best Management Practices with the goal of containing and/or eradicating each population. The EIS includes species defined by two categories:

- Noxious: listed by the Arizona Department of Agriculture as a species that should be controlled, eradicated, and/or prohibited from the state, and
- Invasive: A non-native plant that is not on Arizona's noxious weed list but still possesses the ability to negatively alter ecosystem function.

Law, Policy and Regulation Regarding Non-native and Invasive Plant Species

The principal statutes governing or supporting the management of aquatic and terrestrial NNIPS within the National Forest System include but are not limited to, the following:

> *Multiple-Use Sustained-Yield Act of 1960* (16 U.S.C. §§528 et seq.). This Act declares that the purposes of the national forest include outdoor recreation, range, timber, watershed and fish and wildlife. The Act directs the Secretary of Agriculture to administer national forest renewable surface resources for multiple use and sustained yield.

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 as amended by the National is a United States federal law which authorizes long-range planning by the United States Forest Service to ensure the future supply of forest resources while maintaining a quality environment. RPA requires that a renewable resource assessment and a Forest Service plan be prepared every ten and five years, respectively, to plan and prepare for the future of natural resources. It is found in the United States Code at Title 16, Chapter 36.

Forest Management Act (NFMA) of 1976. Section 6 of the Act codified at 16 U.S.C. §§1600 et seq. The National Forest Management Act reorganized, expanded and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on national forest lands. The National Forest Management Act requires the Secretary of Agriculture to assess forest lands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. It is the primary statute governing the administration of national forests.

Healthy Forests Restoration Act of 2003 (H.R. 1904), (16 U.S.C. 6501-6502, 6511-18, 6541-42, 6571-78). The legislation contains a variety of provisions aimed at expediting the preparation and implementation of hazardous fuels reduction projects on federal land and assisting rural communities, States and landowners in restoring healthy forest and watershed conditions on state, private and tribal lands. It also authorizes large-scale silvicultural research, the acquisition of conservation easements and the establishment of monitoring and early warning systems for insect and disease outbreaks.

The Plant Protection Act of 2000 (7 U.S.C. 7701 et seq.) as amended by the *Noxious Weed Control and Eradication Act of 2004* (P.L. 108-412). To require the Secretary of Agriculture to establish a program to provide assistance to eligible weed management entities to control or eradicate noxious weeds on public and private land.

Forest Service Manual 2900 – Invasive Species Management. Indicates that management activities for aquatic and terrestrial invasive species will be based upon an integrated pest management approach, prioritizing prevention and early detection and rapid response actions as necessary.

National Invasive Species Council. *Management Plan: 2016–2018.* Provides a blueprint for all federal agencies to manage invasive species, including guiding principles and roles and responsibilities. The plan states that the Forest Service has broad authority to prevent the spread of invasive species on NFS lands and is authorized to assist Federal, State, and private entities on lands outside NFS lands. (July 11, 2016).

Executive Order -- Safeguarding the Nation from the Impacts of Invasive Species (Dec 5, 2016) this order amends Executive Order 13112 (issued February 3, 1999 and directs actions to continue coordinated Federal prevention and control efforts related to invasive species. This order maintains the National Invasive Species Council (Council) and the

Invasive Species Advisory Committee; expands the membership of the Council; clarifies the operations of the Council; incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into Federal efforts to address invasive species; and strengthens coordinated, cost-efficient Federal action.

USDA Forest Service National Strategic Framework for Invasive Species Management. Strategic direction for addressing the invasive species problem. (FS-1017, August 2013).

Arizona Noxious Weed Law. The State of Arizona enacted this legislation to recognize the adverse economic and environmental impacts of certain weeds and the need for action to reduce this threat. (Arizona Revised Statutes 3-201 and 3-231).

Forest Service Manual 2080 – Noxious Weed Management. Forest Service policy regarding weeds was revised in 1995 to increase emphasis on integrated weed management in assessments and forest planning. (USDA FS 1995).

Forest Service Manual 2100 – Environmental Management. Provides additional policy requirements for use of pesticides (or herbicides) on FS lands. (USDA FS 1998a).

Kaibab National Forest Plan. The Kaibab National Forest is managed under a Land and Resource Management Plan (LRMP; 2012) that provides direction for managing each resource area within the forest. Forest-wide guidelines in the LRMP for nonnative invasive species include:

> All ground-disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations should be detected early, monitored, and treated as soon as possible.

Description of Proposed Action

The North Kaibab Ranger District (NKRD), through a collaborative process with interested stakeholders, proposes to mechanically thin about 15,000 acres and use wildland fire, alone or in conjunction with mechanical treatment, on about 28,000 acres, see Table 1 and Figure 1 in Appendix A. The proposed action is based on consultation with diverse stakeholders and guided by a quantitative exploration of data that allowed explicit consideration of multiple values and perceived risks associated with this project and the earlier Kaibab Forest Health Focus. See the Environmental Assessment (EA) for details on the purpose and need for action and for full descriptions of the Proposed Action, mitigation measures, and desired conditions. Specific mitigation measures for NNIPS are below.

Table 1. Burnt Corral Vegetation Management Project treatments.

Treatment Type(s) Proposed	Relevant Strata	Maximum Estimated Acreage
Wildland Fire		
Fire only[1]	Ponderosa pine plantations, Bridger fire area, sensitive soils, steep slopes, seed cuts approaching desired conditions	11,530
Mechanical Thinning and Wildland Fire:		
Thin mixed conifer from below to 12"	Mexican Spotted Owl Habitat	360
Thin from below to 14"	Goshawk Nest Areas	2,520
Thin from below to 16"	Old Growth Ponderosa Pine	2,130
Create .5-3 acre early seral openings on 10%, thin to 80 basal area on 90%	Ponderosa Pine Creating Early Seral Openings	8,080
Thin to 80 basal area	Ponderosa Pine with Existing Early Seral Openings	3,470
Total Project Area		28,090

Affected Environment

Several species of NNIPS have been identified within or adjacent to the Burnt Corral Project Area. Table 2 displays the species of concern in relation to the NKRD and the project area. Of these species musk thistle, bull thistle, and spotted knapweed have been identified in the Jacob Lake area along the State Highways and a few adjacent forest roads in the Warm Fire area. There is a population of leafy spurge near Big Springs Field Station. Populations of scotch thistle exist on the westside of the NKRD.

Table 2. Non-native and invasive plant species of concern on the NKRD.

SPECIES	LOCATIONS AND STATUS OF KNOWN POPULATIONS
Musk Thistle *(Carduus nutans)*	Several small populations around the Jacob Lake area, along FS road 22 north of Big Springs and along State Highway 89A.

[1] This includes activities such as preparation thinning and other light mechanical and hand thinning treatments associated with appropriate use and management of prescribed fire and managed wildfire.

Spotted Knapweed *(Centaurea masculosa)*	Small populations in numerous places along State Highways 67 and 89A, and a few isolated occurrences along roads in the Warm Fire.
Scotch Thistle *(Onopordum acanthium)*	Five populations on the western side of NKRD.
Leafy Spurge *(Euphorbia esula)*	One population near Big Springs Field Station, and one on the north end of the Burnt Corral project area off of FS Road 427.
Cheatgrass *(Bromus tectorum)*	Numerous populations across NKRD. Large populations currently exist within the area of the 1996 Bridger Knoll Fire, including the Burnt Corral project area.
Oxeye Daisy (*Chrysanthemum leacanthemum*)	Small populations occur in the Demotte Park area.
Bull Thistle *(Cirsuim vulgare)*	Several populations along State Highways 89A and 67, and in the Warm Fire.
Salt Cedar (*Tamarix ramosissima)*	Large populations exist in the Kanab Creek Wilderness.
Dalmatian Toadflax *(Linaria genistifolia)*	One small population is located along FS road 206 in Quaking Aspen Canyon.
Yellow Starthistle *(Centaurea solstitialis)*	No known populations on NKRD, but can be found on other federal lands in Northern Arizona.
Canada Thistle (*Cirsium arvense*)	Several populations along the eastern boundary of the Burnt Corral project area.
Horehound (*Marrubium vulgare*)	Becoming more frequent. Populations can be found along the northern portion of FS Road 22.

Issues

The key issues of comments received during the (public?) scoping period (when?) of the proposed action were largely concerned with large tree retention and smoke impacts from fire. Only one comment was received regarding non-native invasive plant species, specifically the potential for the invasion of cheatgrass (*Bromus tectorum*) from nearby areas into the project area.

Effects Analysis

All of the activities proposed in this project would likely cause some degree of soil disturbance. When soil is disturbed, and if native vegetation is removed, there is the potential for NNIPS to become established. Some proposed activities create more disturbance than others and thus a greater potential for NNIPS introduction pose a larger threat such as road maintenance, road decommissioning, and construction of temporary roads which will be discussed below.

Fire

Forest fires release nitrogen and increase openings in the forest canopy, and sunlight availability, which facilitates understory growth, especially grasses (White et al 2001). Fire reduces competition from native vegetation allowing non-native or invasive species to be become established or spread. Prescribed fire is designed to burn at low intensities which generally consumes ground fuels with minimal soil disturbance. When soil disturbance is low, the potential for the establishment and of spread of NNIPS is also low as it does not cause loss of the seedbank of native vegetation. Fowler et al (2008) reported a minimal effect on the abundance of NNIPS present following low-intensity fires in ponderosa pine forests. However, Kerns et al (2006) reported the increase in exotic vegetation species following prescribed burns occurring in the fall versus the spring. Keely (2006) has noted regardless of the size of the burn areas, the abundance of NNIPS on the landscape is the largest determining factor of whether newly burned areas will become infested. As burn units are identified, NNIPS surveys surveying areas prior to treatments will be incredibly important to reduce the threat of establishment and/or spread.

Prescribed fire has the potential to create hydrophobic soils, particularly when burning slash piles (Ballard 2000). The heat generated by burning slash piles remains localized and can cause severely burned soils, destroying the seed bank of native vegetation and altering the soil chemistry. Pile burning is typically done from fall to early spring when temperatures are cooler therefore reducing the amount of heat on the soils. Slash piles will be generated following thinning operations. Mitigations measures (specify the measures) have been developed to mitigate the effects of the proposed burning activities to reduce the potential for facilitating the introduction and spread of non-native and invasive plant species.

Thinning

Not only are non-native and invasive species capable of changing the fuel structure of forests (Brooks et al. 2004) they are also capable of setting back both natural and artificial regeneration of the dominant forest trees. The act of thinning trees in all vegetation types reduces the competition by tree seedlings and creates vulnerable areas for infestations. Machinery and vehicles used to carry out thinning activities also disturbs soils which can create additional vulnerable areas. Mitigations have been set up to minimize the disturbance and reduce the possibility of non-native and invasive species establishing or spreading during harvesting activities. An increase in non-native plant response is dependent on the treatment intensity (e.g., basal area removed, number of entries into a stand) as well as the use of prescribed fire for slash disposal (Sutherland and Nelson 2010).

Roads

Gelbard and Belnap (2003) report that the more developed a road is, the more likely an infestation of non-native species will occur within close proximity to the road, and also within the interiors of the forest. More developed roads see higher levels of disturbance from vehicle traffic and maintenance activities. They also create microhabitats with increased sunlight reaching the forest floor, and water running off the road and penetrating the soil adjacent to the road creating great opportunities for non-native and invasive species to become established and spread. Fowler et al (2008) also reported roadways as having higher densities of non-native and invasive species. Soil disturbance will occur as temporary roads and skid trails are built, gravel

pits are explored and developed, and continued road maintenance occurs. These areas will become susceptible to the establishment and spread of non-native and invasive species.

The act of decommissioning roads in itself may cause the establishment and spread of non-native and invasive species as vehicles and machinery enter the site to remove the roads from the landscape. However, over time the risk of establishment and spread may be reduced once the road decommissioning is completed as vehicles will no longer enter these areas.

Cheatgrass is common throughout the project area with the largest concentrations along the 425, 427 and 447 roads. It is also abundant within the area of the 2006 Warm Fire where large patches of early-seral vegetation and snag forest were created. Continued invasion of the project area by exotic grasses like cheatgrass has important implications for restoration outcomes. Cheatgrass quickly established dominance where mechanical logging and prescribed fire were applied in restoration treatments near Mt. Trumbell in northern Arizona (McGlone et al. 2009). Melgoza and others (1990) studied cheatgrass soil resource acquisition after fire and noted its ability to suppress the water uptake and productivity of competing flora. Its annual growth habit coupled with its abilities to germinate in a wide range of moisture and temperature conditions, to initiate growth earlier in spring than other species, and to quickly establish an extensive root system contribute to its propensity for spread. Melgoza and others (1990) also showed that cheatgrass outcompetes established adult individuals of native species because its roots can take advantage of available moisture by reaching deeper into soil. There is scientific uncertainty regarding the efficacy of restoration with regard to forest composition and long-term disturbance pattern.

There are other highly invasive species that occur outside of the project area including several thistle and knapweed species that could be transported in from other areas of the forest and surrounding lands.

Mitigation Measures

Guidance for invasive species management in the southwestern region (USDA 2014) will be followed. In addition, the following mitigation measures are incorporated into the proposed action to minimize the spread and of NNIPS:

- The BC project area will be surveyed for NNIPS species and treated as necessary prior to implementation.
- Contractors and/or Forest Service personnel will ensure all equipment is inspected and cleaned prior to entry onto forest land to ensure removal of all dirt, plants, and other foreign material that may transport noxious weed seeds.

Methodology

Each year FS staff treat known NNIPS infestations across the district, prioritizing the species and locations that pose the greatest threats. This is combined with surveying areas that have recently experienced disturbance, are expected to be disturbed (such as the Burnt Corral project), and/or see high visitor use. This methodology allows the district to control and eradicate new

infestations before they have the opportunity to spread. To date, this methodology has proven successful in eradicating and/or reducing potentially serious noxious species threats. Table 1 displays the species of concern in relation to the NKRD.

To determine the status of non-native and noxious species within the Burnt Corral project area field crews will survey and map the site with GPS units. In addition to the physical location of an infestation, species identification, size of the infestation and type of treatment (if treated) and the name of the individual collecting data is also recorded. This information is then entered into a GIS database to enable visual display of the extent of the populations. This information is also entered into the Forest Service Activity Tracking System database and stored as a reference in order to track such infestations and treatments. Treatments of non-native invasive plants will be prioritized based on factors including the type of plant, the effectiveness of treatments available, and the potential for spread. Treatment options include hand-pulling, effective grazing, and herbicide application.

Cumulative Effects

The area considered in order to analyze the cumulative effects to non-native and invasive terrestrial plant species is the entire project boundary. As infestations are easily established and have the potential to spread rapidly without treatment, or without chemical control, virtually all ground disturbing activities have the ability to encourage the establishment and spread of such species.

Fire

Fire management plays a vital role in ecosystem management. Fire also can create a disturbance that can allow for invasive species to enter and become an infestation. The high intensity portions of 1996 Bridger Knoll Fire performed a direct role in dramatically increasing the cheatgrass infestations on the Central Winter Allotment. Fires that occurred after the Bridger Knoll fire continued to increase the acreage infested and also the percent of cheatgrass frequency. As fires are expected to continue to occur and create disturbance, the ability for invasive species like cheatgrass to invade and spread increases.

Restoring forests to fire adapted ecosystems will be an ongoing effort for the foreseeable future. Managed fires in conjunction with mechanical treatment can reduce heavy fuels, preventing catastrophic fires from occurring

Travel Management

The Travel Management Environmental Assessment was completed in 2012. Implementation of travel management includes the following provisions that pertain to reducing impacts to understory vegetation on the North Kaibab Ranger District:

- Forest visitors will only be allowed to travel designated roads.
- Designated Spur Roads to Recreational Opportunities in areas with sensitive resources.
- Motorized Big Game Retrieval for only elk and bison.

Prior to the implementation of Travel Management, cross country motorized travel was authorized to occur. The reduction of cross country travel was assessed to be a positive benefit to reduce invasive species spread.

Other Vectors

Other potential vectors for introducing and spreading invasive species seed include wildlife, water, wind, and gravity/elevation. These vectors would continue to have the potential to spread weeds at the same rate in all three alternatives.

Climate Change

NNIPS are management problems because inherently these species are well adapted to the changes (warming and drying) occurring to native southwestern forest ecosystems that can challenge native plants. They tend to adapt better and outcompete native vegetation within their own present day ecosystems. With less precipitation, warmer climates and areas more susceptible for wildfires, non-native species will have a greater advantage to outcompete native vegetation. Monitoring and adaptive management will play a key role in managing NNIPS.

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